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A photograph of the U.S. Capitol building in Washington, D.C., viewed from across the reflecting pool. The building is white with a prominent dome and is surrounded by green trees. The sky is overcast and grey. The entire image is overlaid with a blue gradient that is darker at the top and bottom.

Using Performance Measures to Allocate Consumable Funding

Dr David Fulk
Dr Douglas Blazer
Mrs Deb Hileman

Abstract

This presentation will show the how the Air Force can use performance measures to allocate funds for consumable items. Often times, funds are allocated to individual bases using past usage, regardless of the performance achieved. Further, funding cuts are often “peanut butter” spread evenly across bases regardless of the performance impacts. The Air Force is now using the Customer Oriented Leveling Technique (COLT) to determine levels for consumable items at its bases. COLT is an optimization technique that finds the minimum unit customer wait time per stock fund dollar available. By changing the stopping conditions within COLT, we can change the projected performance at a base. We can do this in such a way to maintain overall costs, yet allocate levels/funds based on desired performance, equalizing performance or weighting it. Further, if we are required to source funds due to budget cuts or other shortfalls, it can be done in a way to equalize impact to the user. This allows the Air Force to better spend its funds.



Terminology

- COLT – Customer-Oriented Leveling Technique
- GSD – General Services Division
- MAJCOM – Major Command
- SBSS – Standard Base Supply System
- DL – Demand Level
- ALC – Air Logistics Center
- ECWT – Expected Customer Wait Time



Overview

- Background
- Equalizing Support
- Uses



Overview

- **Background**
 - **Current Allocation**
 - **Motivation**
 - **COLT**
- Equalizing Support
- Uses



Current Allocation

- Funding
 - Traditional allocation of General Services Division (GSD)/ consumable funding for one year is based on the funding from the previous year for each Major Command (MAJCOM) and base
- Leveling
 - SBSS Demand Level (DL): Old (still current at some locations) leveling system, which is based purely on past demands without regard to cost or operational effectiveness
 - COLT: New leveling system, which uses other performance measures in determining levels, but is restricted to use the same projected obligations as DL
 - Both leveling systems run by base



Motivation for Consumable Funding Effort

Base	Primary MDS	Total Obligations	COLT ECWT	DL ECWT	Ending Sort Value
Dover	C-5	\$8.77M	0.82	2.18	0.000152
Travis	C-5	\$8.66M	0.68	2.33	0.000117
Dyess	B-1	\$6.04M	0.93	3.13	0.000076
Ellsworth	B-1	\$4.22M	0.66	2.26	0.000059

- Dover – Travis and Dyess – Ellsworth have similar missions and the same aircraft within each group, yet:
 - Expected customer wait time (ECWT) is different
 - Sort Value (reduction in expected backorders per dollar) is different
- Can/should we change this?
- Can/should we tie funding closer to performance measures?
- Already doing this with the Air Force Depots



Customer-Oriented Leveling Technique (COLT) Overview

- COLT is a system to set AF retail stock levels for DLA-managed consumable parts to minimize expected customer wait time (ECWT)
- COLT now operating at 139 AF bases total
 - AF-wide implementation scheduled to be complete by Mar 08
 - Also at the 3 Air Logistics Centers (ALCs)
- COLT runs 1 base at a time, using a marginal analysis technique to find the minimum expected backorders (or ECWT) for the stock fund dollars spent
- COLT optimization technique theoretically superior to previous method
 - Optimization on backorders (customer wait time) is superior to fixed safety level
 - Linked to DLA levels—DLA stocks more, less safety level needed at the base



Obligations

- COLT runs to the estimated DL obligations
- $\text{Obligations} = \text{Estimated \# of Orders} * \text{Estimated Order Size} * \text{Cost}$
 - $\text{Estimated \# of Orders} = \text{Estimated Assets Required} / \text{Economic Order Quantity, Rounded Up}$
 - $\text{Estimated Assets Required} = \text{Projected demands for the remainder of the year} - \text{Projected available assets} + (\text{Reorder point} + 1)$
 - $\text{Estimated Order Size} = \text{Economic Order Quantity}$
 - $\text{Cost} = \text{Unit Price}$
- Example:
 - Projected demands rest of year = 30, projected available assets = 10, ROP = 7, EOQ = 12, UP = \$4.12
 - $\text{Estimated Assets Required} = 30 - 10 + 7 + 1 = 28$
 - $\text{Estimate \# of Orders} = 28 / 12 = 2.33 \uparrow 3$
 - $\text{Obligations} = 3 * 12 * \$4.12 = \$148.32$



Is this Fully Effective?

- COLT running to DL obligations means it is **cost-neutral**
 - Therefore it is more effective at the same cost for each base
- Since SBSS levels (and obligations) provide uneven support across the AF
 - We may not have the optimum use of available GSD dollars
 - We are not obtaining the best levels across the AF



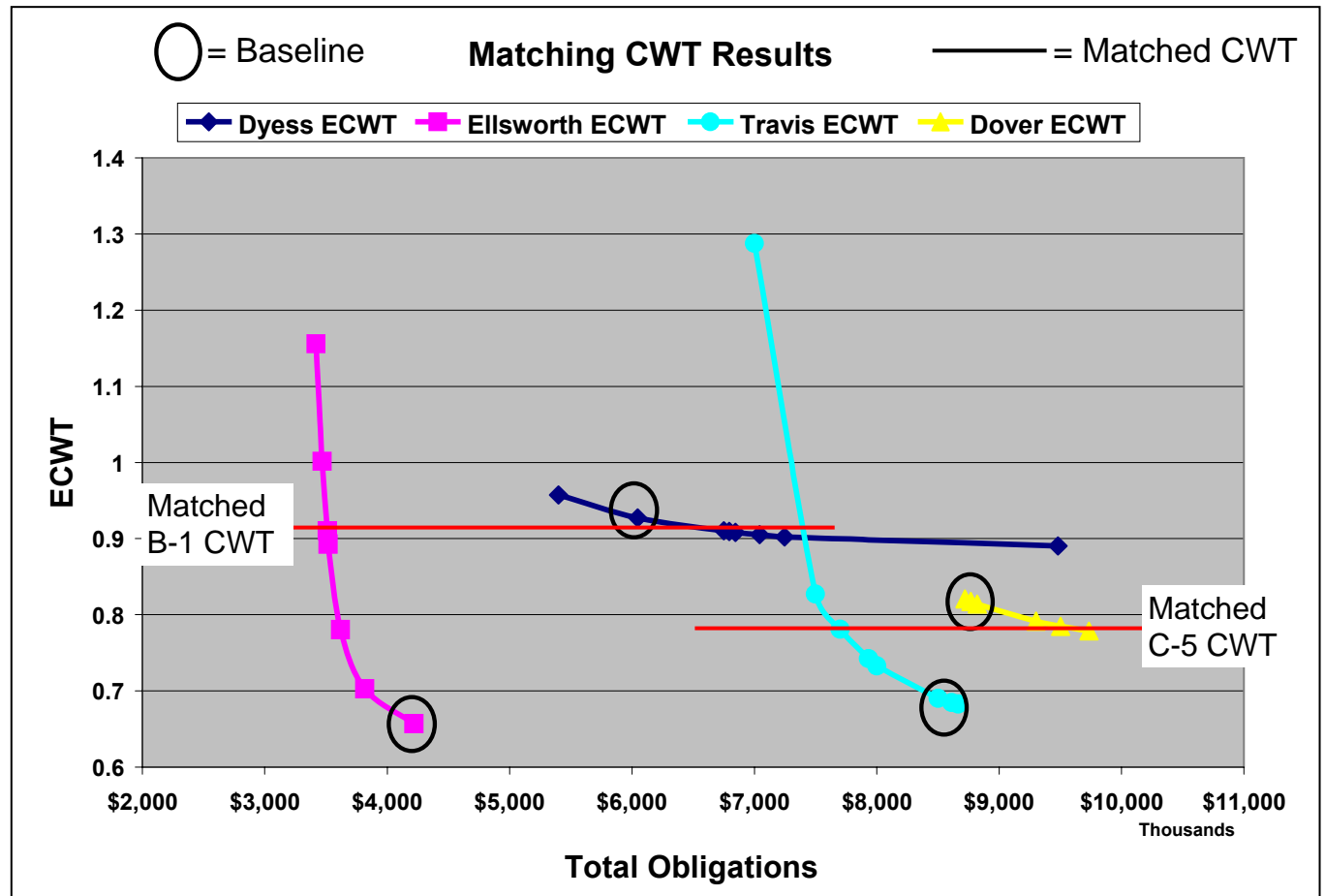
Overview

- Background
- **Equalizing Support**
 - **Changing Support**
 - **Equalizing Support at ALCs**
 - **Equalizing Support at Bases**
- Uses

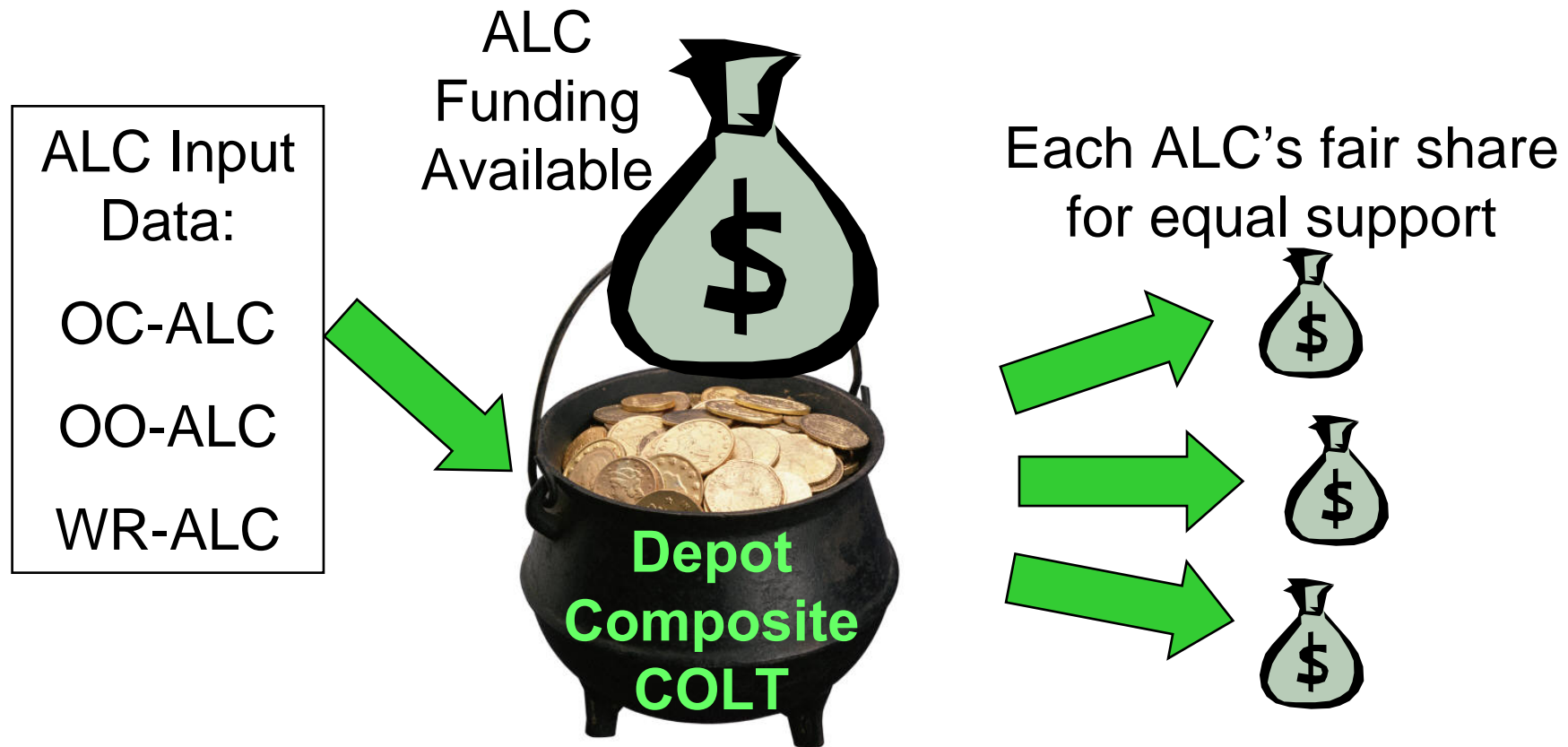



Changing Support in COLT

- By changing the stopping criteria, the amount of obligations used by a base, and the level of support provided to that base, can change
- Reducing obligations at one base can “free up” resources to be spent at another



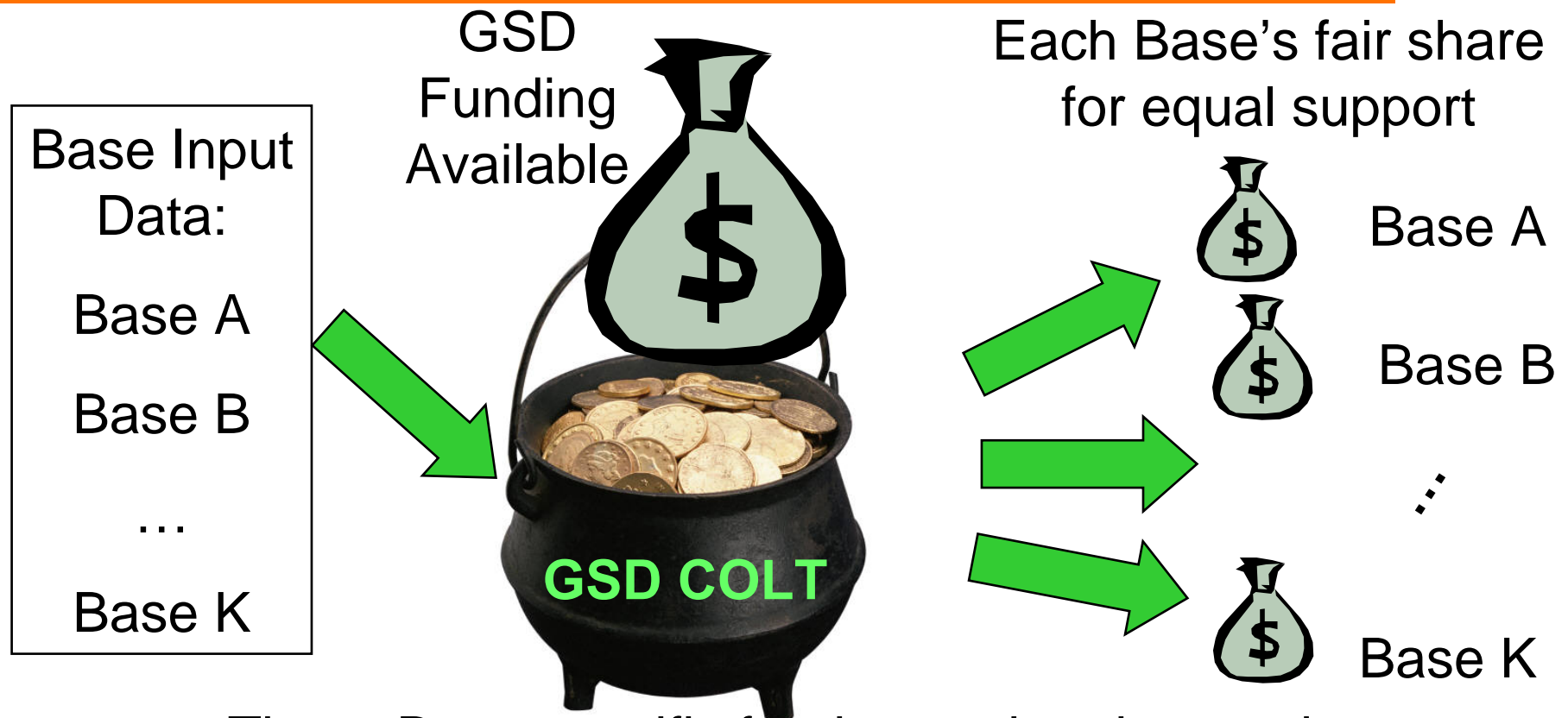
Equalize Support Levels – Depot COLT




 Those ALC specific funds can then be used to determine the levels that provide equal support (equal sort value)



Potential Support at Bases



 Those Base specific funds can then be used to determine the levels that provide equal support by MAJCOM, Primary MDS, CONUS/OCONUS, etc



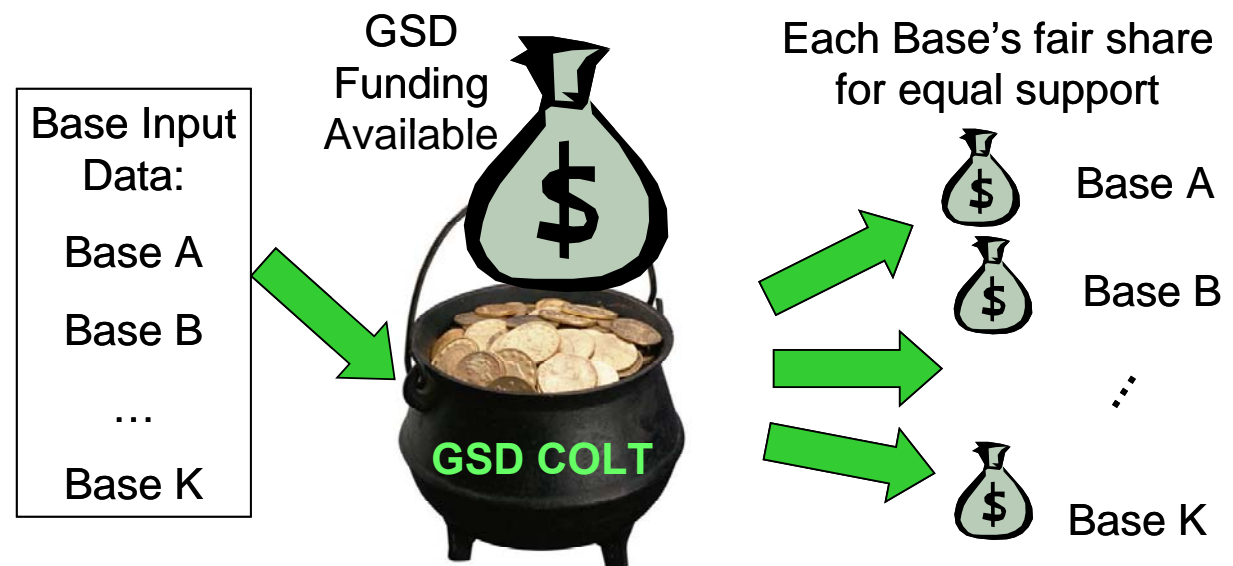
Overview

- Background
- Equalizing Support
- **Uses**
 - **Equalize/Target Support**
 - **Funding Trade-offs**
 - **Funding Shortages**



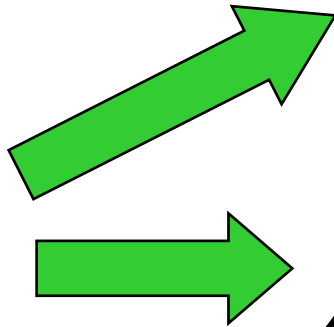
Equalize/Target Support at Bases

- Equalize support
 - Match 2 or more bases ECWT or Sort Value
 - Equalizes the support for like weapon systems, bases, MAJCOMs
- Targeting support
 - Providing targeted ECWT or Sort Value improvements can improve bases where leadership wants to place emphasis



Funding Trade-offs

Funding
Available



Funding needed for a
contingency, CRSP, etc



Remaining funding, but
how does this get
reallocated? Who gets
“shorted”?

- Using the potential GSD support method, funding reduction can be targeted to a specific group of like bases (same MDS, MAJCOM, etc)
- The fair share reduction for each base can be determined so that they would still receive like support
- Impact of the reduction can be **quantified**



F-15E CRSP Example

Option	Bases	Levels Chg	ECWT Chg
Home Station	Total	-22.3K (-3.2%)	+0.067 (8.2%)
	Mt Home (100%)	-22.3K (-3.2%)	+0.067 (8.2%)
ACC	Total	-21.3K (-1.4%)	+0.025 (3.0%)
	Mt Home (33%)	-6.4K (-0.9%)	+0.020 (2.4%)
	S-J (67%)	-14.9K (-1.8%)	+0.029 (3.5%)
Active	Total	-18.7K (-0.5%)	+0.012 (0.9%)
	Mt Home (17%)	-2.8K (-0.4%)	+0.009 (1.1%)
	S-J (33%)	-7.1K (-0.8%)	+0.013 (1.6%)
	Elmendorf (17%)	-4.1K (-0.3%)	+0.008 (0.4%)
	Lakenheath (33%)	-4.8K (-0.6%)	+0.019 (1.2%)

3 options to obtain CRSP funding:

- 1) take it all from the home station
- 2) take it from the ACC bases using the same MDS
- 3) take it from all active duty bases using the same MDS

- As expected, when taking all the funds from a single base, the impact (in ECWT) is relatively large on that base. Spreading out the costs to multiple bases (based on the number of mission squadrons) reduces the impact to any one base and overall



Funding Shortage Example

Run	Base	Total Obligs	Obligations Change	COLT Levels	Levels Change	COLT ECWT	ECWT Change
Baseline	Travis	\$8.66M		1,110K		0.683	
Baseline	Dover	\$8.77M		1,002K		0.818	
Baseline	Total	\$17.43M		2,113K		0.751	
10%	Travis	\$7.80M	-\$866K (-10%)	1,053K	-58K (-5.2%)	0.760	+0.077 (11.3%)
10%	Dover	\$7.89M	-\$877K (-10%)	888K	-114K (-11.4%)	0.955	+0.138 (16.9%)
10%	Total	\$15.69M	-\$1743K (-10%)	1,940K	-172K (-8.2%)	0.859	+0.108 (14.4%)
Even CWT	Travis	\$7.72M	-\$939K (-10.8%)	1,042K	-68K (-6.1%)	0.775	+0.092 (13.4%)
Even CWT	Dover	\$7.96M	-\$804K (-9.2%)	906K	-96K (-9.6%)	0.927	+0.109 (13.4%)
Even CWT	Total	\$15.69M	-\$1743K (-10%)	1,949K	-164K (-7.8%)	0.852	+0.101 (13.4%)

- The '10% Run' shows taking a 10% reduction for both bases
- The 'Even CWT Run' shows taking the same 10% overall reduction, but in a way to equalize decreased support to the user



Summary

- COLT is an improvement over previous leveling, but it is limited to one base at a time
- The concepts in this paper can extend those improvements across the AF
 - Target support where needed
 - Equalize support for like bases
 - Identify sources for funding shortages/unfunded needs
 - Allocate funds based on performance measures
 - Defend budget estimates and funding cuts



Next Steps

- Develop the business rules to exploit current COLT capabilities
- Code the changes to COLT to automate this concept
- Pilot test the capabilities with the Logistics Support Centers
- Make COLT part of the Global Logistic Support Center capabilities



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Funds Allocation Example

Base	Current COLT Obligations	Fair Share COLT Obligations	Diff	% Diff	% Change in ECWT
Travis	\$4.808M	\$4.962M	+\$153K	+3.2%	-1.0%
Dover	\$4.267M	\$4.618M	+\$351K	+8.2%	-2.1%
Minot	\$2.240M	\$1.991M	-\$249K	-11.1%	+1.6%
Barksdale	\$3.918M	\$4.038M	+\$120K	+3.1%	-0.6%
Dyess	\$4.776M	\$4.612M	-\$164K	-3.4%	+0.6%
Ellsworth	\$2.979M	\$2.770M	-\$209K	-7.0%	+2.5%
TOTAL	\$22.988M	\$22.991M	+\$3K	+0.0%	-0.2%

- The current COLT obligations are based on individual base obligations, while the “Fair Share” COLT obligations are based on running all bases together



Targeted CWT Support – C-5 Example

Run	Base	Total Obligations	COLT ECWT	DL ECWT
Baseline	Dover	\$8.77M	0.82	2.18
Baseline	Travis	\$8.66M	0.68	2.33
Merged	Both	\$17.43M	0.75	2.25
Match CWT	Dover	\$9.73M	0.78	2.18
Match CWT	Travis	\$7.70M	0.78	2.33

- “Merging” the bases provides the optimal Air Force-wide expected CWT (ECWT) for the given obligations, but each base might have different performance (ECWT)
- Matching the CWT provides the same performance for each base for the same total obligations, but it isn’t quite as effective as merging



Targeted CWT Support – B-1 Example

Run	Base	Total Obligations	COLT ECWT	DL ECWT
Baseline	Dyess	\$6.04M	0.93	3.13
Baseline	Ellsworth	\$4.22M	0.66	2.26
Merged	Both	\$10.26M	0.86	2.90
Match CWT	Dyess	\$6.75M	0.91	3.13
Match CWT	Ellsworth	\$3.51M	0.91	2.26

- “Merging” the bases provides the optimal Air Force-wide expected CWT (ECWT) for the given obligations, but each base might have different performance (ECWT)
- Matching the CWT provides the same performance for each base for the same total obligations, but it isn’t quite as effective as merging



AEF 5/6 CRSP Example

MDS	Funds Req'd	Option	Bases	Levels Chg	ECWT Chg
F-15E	\$194K	Home Station	Mt Home (100%)	-22.3K (-3.2%)	+0.067 (8.2%)
		ACC	Mt Home (33%), S-J (67%)	-21.3K (-1.4%)	+0.025 (1.5%)
		Active	Mt Home (17%), S-J (33%), Elmendorf (17%), Lakenheath (33%)	-18.7K (-0.5%)	+0.012 (0.9%)
F-22	\$204K	Home Station	Langley (100%)	-31.8K (-4.6%)	+0.099 (11.3%)
A-10	\$243K	Home Station	Pope (100%)	-22.5K (-3.4%)	+0.107 (10.4%)
		ACC	Pope (67%), D-M (33%)	-17.6K (-1.1%)	+0.034 (2.3%)
		Active	Pope (50%), D-M (25%), Spangdahlem (25%)	-19.2K (-0.9%)	+0.034 (1.8%)
B-1	\$158K	Home Station	Ellsworth (100%)	-9.3K (-2.8%)	+0.078 (7.3%)
		ACC	Ellsworth (67%), Dyess (33%)	-9.7K (-0.7%)	+0.018 (1.4%)

